

PROCEEDINGS

OF THE

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STATE BOARD OF DRAINAGE COMMISSIONERS,

AT A MEETING HELD MAY 28, 1880.

Information of Drainage District No. 1.

REPORT OF THE STATE ENGINEER IN THE MATTER OF A DRAINAGE  
DISTRICT FOR THE SACRAMENTO VALLEY.

UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES

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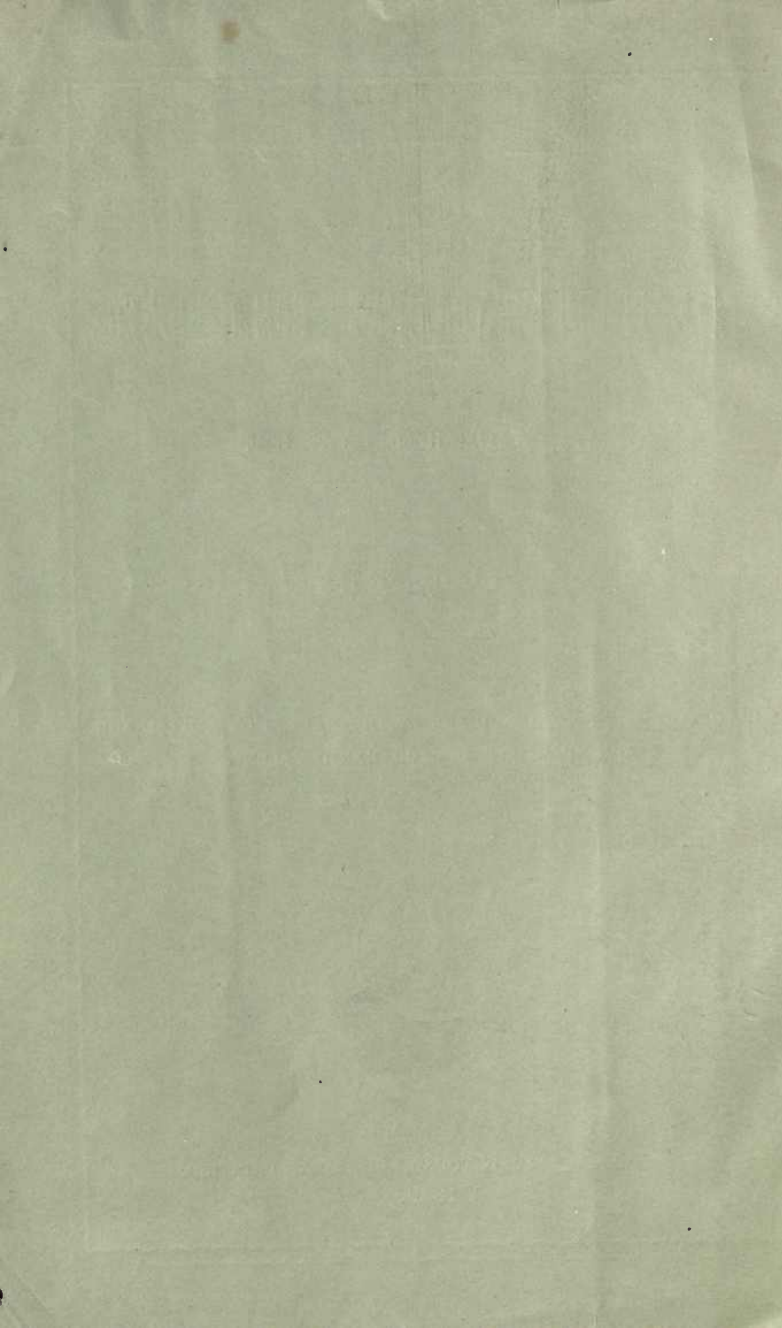


SACRAMENTO:

STATE OFFICE : : : J. D. YOUNG, SUPT. STATE PRINTING.

1880.





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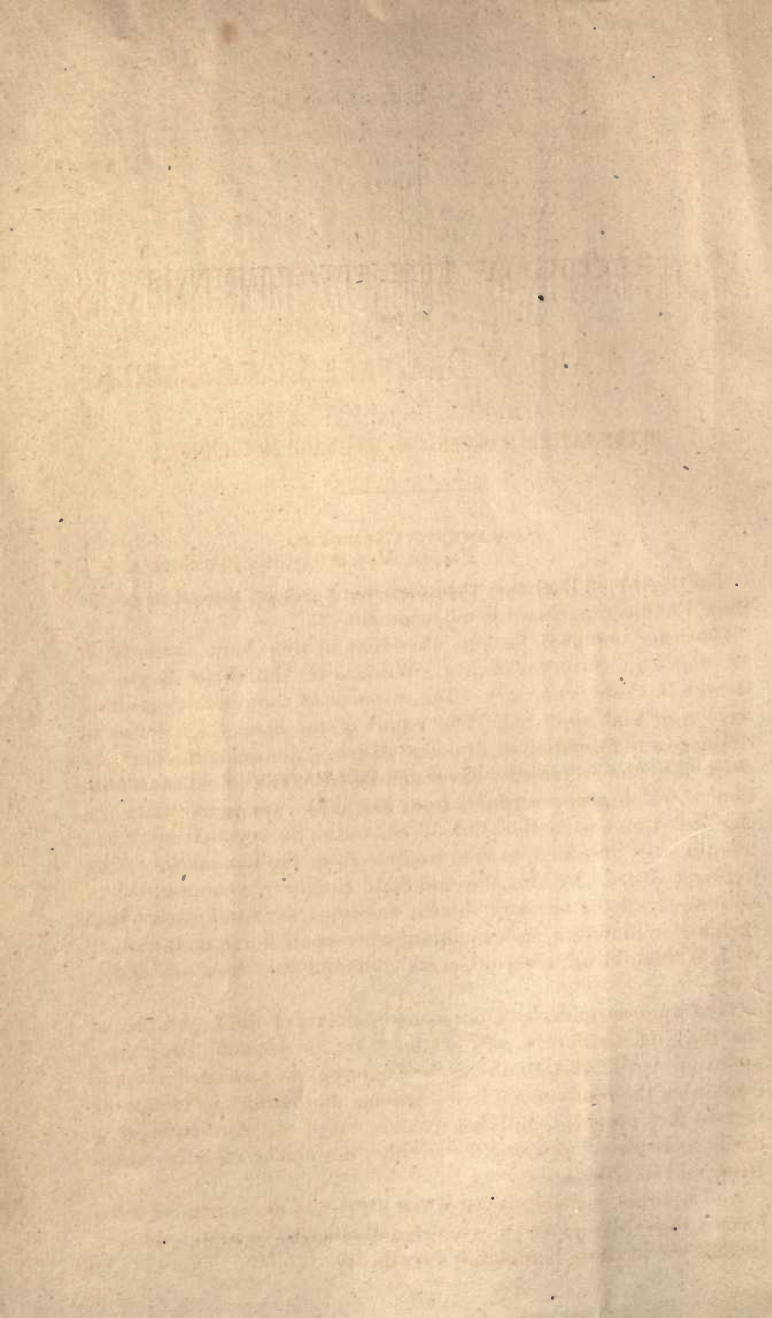
Formation of Drainage District No. 1.

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REPORT OF THE STATE ENGINEER IN THE MATTER OF A DRAINAGE  
DISTRICT FOR THE SACRAMENTO VALLEY.



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RECORD OF THE PROCEEDINGS  
OF THE  
STATE BOARD OF DRAINAGE COMMISSIONERS,  
IN THE MATTER OF ORGANIZING DRAINAGE DISTRICT NO. 1

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SACRAMENTO, CALIFORNIA,  
Friday, May 28th, 1880, 10 o'clock A. M. }

The Board of Drainage Commissioners met at the office of the State Engineer, pursuant to adjournment.

Governor George C. Perkins, President, in the Chair. Present: J. W. Shanklin, Surveyor-General; William H. Hall, State Engineer; George B. Cosby, Secretary. The minutes of the previous meeting were read and approved. The report of the State Engineer as to drainage and formation of drainage districts, including the territory drained by the Sacramento River and its tributaries, final consideration of which was postponed from May 27th, was again taken up, considered, and on motion of J. W. Shanklin, Surveyor-General, was unanimously amended, so as to exclude from the boundaries of the drainage district, by him, the said State Engineer, recommended to be formed, all the territory therein described, save and except that included in the following description; whereupon, it was, upon motion of J. W. Shanklin, Surveyor-General, unanimously resolved, as follows:

That whereas, under and pursuant to an Act of the Legislature of the State of California, entitled an "Act to promote Drainage," approved April 23d, 1880, the State Engineer has presented a report containing the result of his investigations, as to drainage, to date, as in said Act provided, and has recommended the formation of a drainage district, comprising the territory drained by the Sacramento River and its tributaries;

And whereas, the boundaries of the district so recommended to be formed have been amended, altered, and changed so as to read and include the territory hereinafter described;



Now, therefore, it is hereby resolved, That the report of Wm. H. Hall, State Engineer, recommending the formation of a drainage district of that portion of the State of California as described in said report, and amended by this Board as to the boundaries thereof, be and the same is hereby approved and adopted, as amended, and that portion of the territory of the State of California hereinafter described, being the territory described in said report as amended by this Board, is hereby declared to be and the same is hereby formed into a drainage district, to be known and designated as Drainage District Number One.

The land and territory hereby declared as Drainage District Number One (1), is described as follows, viz:

Commencing on the south line of section one of township four north, range two east, Mount Diablo base and meridian, at the quarter section corner in the county of Solano, being the point of intersection between the State line of segregation as finally adopted, and the westerly boundary of the *Rancho de Los Ulpinos*; thence following said segregation line to the boundary between Solano and Yolo counties; thence following said county boundary line between the two counties, to the corner common to Solano, Yolo, and Napa counties; thence following the boundary line between Yolo and Napa counties, and the boundary line between Yolo and Lake counties, to the corner common to Lake, Yolo, and Colusa counties; thence following the boundary line between Colusa and Lake counties, and the boundary line between Mendocino and Tehama counties, and the boundary line between Tehama and Trinity counties, to the corner common to Tehama, Trinity, and Shasta counties; thence following the boundary line between Tehama and Shasta counties, to the corner common to Tehama, Shasta, and Plumas counties; thence following the dividing ridge or watershed line between the drainage area of the Sacramento Valley, and the drainage area of the great basin of Nevada in an easterly and southerly direction, to the intersection of said ridge line, with the ridge which divides the basin of the American River from the basin of the Mokelumne River; thence following said last mentioned ridge in a westerly direction to the head of the ridge which divides the basin of the American from the basin of the Cosumnes River; thence following said last mentioned ridge line to the point of its intersection with the State line of segregation as finally adopted on the east side of the Sacramento River; thence following said line of segregation to the Cosumnes River; thence down that river to its junction with the Mokelumne River; thence down that river and its west fork, to Snodgrass Slough; thence along said Slough to its junction with Tyler Slough, and along that Slough to

Georgiana Slough; thence along Georgiana Slough to its junction with the Old River channel of the Sacramento River; thence down Old River channel to its junction with Steamboat Slough; thence west to the west bank of the Sacramento River; thence along the westerly bank of the Sacramento River to a point on the Rancho de los Ulpinos, where the high land extends to the river bank; thence following the line of separation between the high and low land to the point of beginning.

All of which territory included in the description aforesaid, is hereby declared to be, and is, and shall be a drainage district, to be known and designated as Drainage District Number One.

J. W. Shanklin, Surveyor-General, moved that the report of the State Engineer, Wm. H. Hall, be spread, as received by this Board, upon the minutes of this meeting, and that the minutes, including the foregoing amendment to the report of the State Engineer, be printed.

It was so ordered by the Board.

The Board of Drainage Commissioners then adjourned, to meet at the call of the President.

GEORGE C. PERKINS, President.

G. B. CosBY, Secretary.

[The report of the State Engineer as received by the Board and ordered printed is as follows:]

# REPORT.

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Governor GEORGE C. PERKINS, *President of the State Board of Drainage Commissioners, and to the State Board of Drainage Commissioners:*

Under and by virtue of the law entitled *An Act to promote Drainage*, it has become the duty of the State Engineer to report to the Board of which the Governor is made President, concerning (1) "The results of his investigations as to drainage," and (2) "The results of his special examinations, made with reference to the division of the State into several drainage districts," as well as (3) to "propose boundaries for such districts and recommend their formation." (See section two.)

The general results of investigations hitherto made by the State Engineer into the matter of drainage in the great valleys of the State, have been embodied in the second and third parts of my report made to the Legislature, during the month of January of this year. That paper was prepared in compliance with instructions incorporated into the law, approved March 29th, 1878, which created the office of State Engineer, and required the incumbent thereof to report in this connection, concerning the principles which ought to govern in the relief of rivers when in flood, in the improvement of the large streams as navigable channels, and in the management or disposal of mining detritus. A general treatment for the whole field observed and studied—more particularly that of the Sacramento Valley—is given in the parts of my report spoken of, which are entitled a report upon "The Drainage of the Valleys and the Improvement of the Navigation of Rivers," and a report upon "The Flow of Mining Detritus," respectively.

It is believed that the law, already referred to, which has called the State Drainage Commission into existence, is based in a great measure upon the leading conclusions put forth in these papers; and, as preliminary to the outlining of districts and the formation of definite plans for works, it is thought these conclusions, with the general treatment of the problem which has led up to them, constitute a sufficient ground for action. As a compliance with the first instruction—namely, "That the State Engineer shall submit \* \* \* a report or reports containing the results of his investigations as to drainage"—



I transmit a copy of the special reports above mentioned as already submitted to the Legislature.

Preliminary to the general designation of boundaries for a drainage district, or districts, it is not necessary under the law, after what has been done, for one acquainted with the country, to make any "special examinations," other than those which can be made upon maps in this office "with reference to the division of the State into several drainage districts." In the first place, I presume that it was the intention of the Legislature that districts should be formed only where a necessity existed therefor. The State Engineer is instructed to "propose boundaries for such districts" "from time to time" only. Now it is well understood that the necessity is most apparent in the Sacramento Valley; and, therefore, I have specially examined and studied that case—as to what should constitute a drainage district under the law, and what territory would be embraced in any district to be formed in the Sacramento Valley, to carry out the letter and spirit of the law—and upon it I propose to report now.

#### DRAINAGE DISTRICTS.

The Legislature has authorized the formation of districts, each of which shall act as an unit in the matter of promoting the drainage of its territory, and has established a rule of action to be followed in putting this provision of the law into force. Thus, in requiring the State Engineer to propose boundaries for drainage districts, it lays down the rule to be followed by him in outlining such tracts, by saying that "each \* \* \* \* shall include a territory drained by one natural system of drainage;" so that this officer is required to act primarily in the capacity of an expert in the matter of designating the several territories in the State, each of which is drained by one natural drainage system.

While he is expected to propose boundaries for districts, it is only as to the necessity for their existence, and the time at which he will recommend their formation, that he is left without a rule to govern him; for the law distinctly says that he shall "propose boundaries for *such* districts," namely: Districts each of which includes a territory drained by one natural system of drainage. The only points he has to consider then are, as to what constitutes such a territory, and what lines bound such territories in the region where it is reasonable to suppose the Legislature intended this law to apply, or where there is a necessity for its application; and that region, as I have said before, is more particularly, the Sacramento Valley.

The removal of the surplus waters of a region through the action of the force of gravity alone, where the water finds an escape through

channels not artificially formed, constitutes *natural* drainage. Such drainage is complete when the waters have reached their ultimate outfall at the level of the sea, and find no further plane of inclination along which to course under the influence of gravity. A drainage system is an aggregation of drains tending towards a common point of outfall, and whose waters usually approach that point through one channel common to all. A natural drainage system is made up of the main and all subsidiary and tributary channels within the limits of a watershed area, and such an area constitutes "a territory drained by one natural system of drainage."

Hence the whole of the Sacramento Valley, and the watershed of the entire Sacramento River—the main stream and its tributaries—constitutes a territory which, under the law, the State Engineer is obliged to designate as a region suitable to be formed into a drainage district.

#### DRAINAGE AND RECLAMATION DISTRICTS.

It is well at this point to consider for a moment the difference between a drainage district and a reclamation district; seeing that they must both exist under the order of things to be inaugurated by the *Act to promote drainage*.

A reclamation district is properly a tract of land which may be protected from overflow by one continuous bulwark or levee; a tract not separated or divided by any stream which must be left open to carry away the waters of floods; a tract so formed topographically that flood waters gaining admittance at the head, or upper end, must necessarily spread over all below, there being no main stream or high point of land to intercept or divert them; and, consequently, a tract which generally should and often must be entirely protected in order that any considerable portion may be safe from inundation. For instance, each of the great low-land basins in the Sacramento Valley, together with the plains bordering it and subject to occasional overflow, constitutes a natural reclamation district; and also each of the islands lying in the delta of the San Joaquin and Sacramento Rivers should be regarded in the same manner. We consider such a tract as a district, because all of its parts are interdependent in the matter of protection from overflow, which in nature may be the case either absolutely or in a less and varying degree. Examples of every degree of interdependence may be found in the natural reclamation districts of the Sacramento Valley; and in some instances, but not frequently, one of such districts may be divided without serious detriment to either part in a scheme for reclamation.

As we have seen, a drainage district should include at least all of the

territory within any drainage area which embraces within itself the channels or routes of escape for the waters which are to be conducted away. In the simplest case which we may with reason depict, where a single stream without tributaries courses through a valley, with a marsh or basin on each side, a drainage district, as here defined, will include at least two reclamation districts. In the Sacramento Valley, while there should be but one drainage district, there must of necessity be ten or twelve reclamation districts.

Aside from the great main drainage of a district, as here spoken of, there must be drainage also for the lower lands of the several reclamation districts. This drainage is of another character—in a varying degree in each instance—from that with which the *Act to promote drainage* proposes to deal; just as house drainage and plumbing in a city differs from the main sewerage system; and just as sub-drainage of agricultural lands differs from the opening out of the stream into which its waters are conducted; or, in the converse proposition of irrigation, just as the distributing and farm ditches differ from the main canal works of the system.

To be completely reclaimed all lands in a reclamation district must be drained, if otherwise too wet for cultivation, or other agricultural use to which it may be desired to put them, but it is not necessary that all lands of a drainage district shall be reclaimed before we may say that such district is well drained; and yet, before all or nearly all lands in a drainage district can be reclaimed, the district, as such, must be well drained. Hence we have the word "drainage" used in a double sense—as we apply it to the drainage of individual tracts, without regard to the great natural drainage ways, or as we apply it to the drainage area of which such natural channels constitute the drains.

In the case of the reclamation district, we plan against overflow of the lands, with an eye single to the one object of holding off the flood, no matter what other tracts it may cover; the volume of water, the capacity and condition of the channel in which it must escape, is not considered.

In the case of the drainage district, we are to look upon the river as a sentient being, a living organism, in which each main and tributary channel, with its floods, is to be considered as an integral part not to be dispensed with, and whose influence cannot be neglected. We are to plan for the expansion and adjustment of the parts of this monster, in order that it be self-contained; we are to improve the channels, with an eye single to the waters to be cared for, without special regard for the lands of any particular reclamation district.

In the case of the reclamation district, we look upon its lands and



its levee: Are the levees long enough and high enough to keep the waters off this tract?

In the case of the drainage district, we contemplate its rivers and their waters: Are the channels of good regimen, and of sufficient capacity to receive and carry away the flood waters?

Now, in the Sacramento and San Joaquin Valleys, we have these questions to answer. Those with respect to drainage districts must be responded to favorably—in the affirmative—the channels must be of good regimen and sufficient capacity to receive and carry away the waters of ordinary floods, before reclamation of the adjacent lowlands can ever be effected.

In addition to this situation presented naturally, we have, in the Sacramento Valley particularly, the complication brought about by the effect of detritus from the mines, which is filling the main channels for a considerable portion of their length, and thus destroying their efficiency for the whole valley, both as drains and navigable rivers.

In the report submitted by myself, as State Engineer, to the Legislature, in January, certain remedies for these evils were proposed. Various methods of disposing of the mining detritus were suggested: preventing it from entering the cañons, when it can be otherwise disposed of; storing it in the cañons, on the flats at the mouths of the cañons, or on the plains, by means of dams and embankments; and diverting the waters carrying it into the low-land basins.

It was pointed out that the application of no one of these methods would afford complete relief. It was shown that they must be availed of each, according to the particular circumstances of the case, and all in a degree at least. And it was distinctly set forth that a systematic treatment of the drainage ways of the valley must accompany any efforts to dispose of this mining detritus, in order that the benefits therefrom might be made apparent.

The Legislature passed the *Act to promote drainage*, popularly known as the "Debris Bill," and under it, I presume, all of the works are to be undertaken which may be necessary to accomplish the desired results.

#### A DRAINAGE DISTRICT FOR THE SACRAMENTO VALLEY.

I am clearly of the opinion that but one drainage district can be formed in the Sacramento Valley, and that the "territory drained by one natural system of drainage" in this case comprises all of the area whose waters shed into its drains.

This territory may be described as follows:—

Commencing on the north bank of the Sacramento River at the



mouth of Montezuma Slough, and opposite the junction of the Sacramento and San Joaquin Rivers, and running thence in a northeasterly direction to the summit of the Montezuma Hills; thence following the ridge line of the watershed between the Sacramento and the Suisun Valleys in a northerly and northwesterly direction, and the ridge line of the watershed between the Putah and Suisun creeks, and between the Putah and Napa creeks, in a northwesterly direction, and the ridge line of the watershed between the Clear Lake basin and that of Russian River, to Mount St. John; thence northerly along the crest of the Coast Range of mountains to the divide between the waters of Trinity River and those of the Sacramento River; thence along said divide northerly and easterly to Mount Shasta; thence southerly, easterly, and northerly, along the line of watershed which flanks the drainage area of Pitt River; and returning to the south again, following said divide or watershed line to the summit of Lassen's Peak; thence following the crest of the Sierra Nevada Mountains to the head of the dividing ridge between the basins of the American and Mokelumne Rivers; thence westerly down the said dividing ridge to the dividing ridge between the basins of the American and Cosumnes Rivers; thence westerly down said last mentioned dividing ridge to the edge of the swamp or overflowed land lying east of the Sacramento River; thence following the eastern boundary of said swamp or overflowed land southerly to the Mokelumne River; thence down said river to its junction with the San Joaquin River; and following the course of the San Joaquin River to a point opposite the place of beginning at the mouth of the Sacramento River.

Including all of Solano County which slopes toward the Sacramento River; all of Napa which drains into Putah Creek; all of Lake which drains into Putah Creek, Clear Lake, and Cache Creek; all of Yolo, Colusa, Tehama, and Shasta counties; all of Siskiyou and Lassen counties which drain into the upper Sacramento, McCloud, and Pitt Rivers; all of Plumas and Lassen counties which drain into Feather River; all of Butte, Sutter, and Yuba counties; all of Sierra, Nevada, and Placer counties west of the summit line of the Sierra Nevada Mountains before mentioned; all of El Dorado County west of said summit and north of the ridge between the basins of the American and Mokelumne and American and Cosumnes Rivers; all of Sacramento County north of the ridge line crossing the plains from said mountain ridge to the swamp land line, and all of the swamp lands in Sacramento County.

## RECOMMENDATION.

Now, therefore, in view of the instructions to the State Engineer, contained in section two of an Act entitled *An Act to promote drainage*, approved April 23d, 1880, I report that I have made such "special examinations with reference to the division of the State into several drainage districts" as seems to me necessary for the purposes of a partial report at this time; and that I recognize in the region whose outlines have just been given, and which embraces the Sacramento Valley, together with the watershed areas of the Sacramento River and all its tributaries, a "territory drained by one natural system of drainage," and that as a consequence, it is one which must be designated by me as suitable to compose a drainage district.

And in view of the necessity which exists in the said Sacramento Valley for immediate action in the matter of restraining the flow of sands into its navigable rivers, and for treating such rivers for their improvement, in order that drainage may be promoted and the streams saved from further deterioration, I recommend that a drainage district be formed in said Sacramento Valley, to embrace the region naturally draining into its rivers, as before described.

## THE DISTRICT PRINCIPLE.

In providing for the formation of such districts the Legislature has recognized the principle which governs in the outlining of sewerage districts in large cities, namely: that there is a community of interest, an interdependence between the land surfaces from which drainage waters are shed and those over or through which they may run.

When it was first proposed that lot-holders at the extreme head of a valley, where a drain or sewer was hardly necessary at all, and at most a very small pipe would suffice, should pay an *ad valorem* tax on their lots towards the construction of the large sewers at the lower end of the district in the city, the idea, doubtless, did not meet with favor; and in new countries the reasonableness of the point in the case cited is frequently overlooked, as it has been in California.

But in older lands this view is becoming more and more accepted, so that drainage works for large areas of country, as well as sewerage systems for cities, are constructed by district coöperation, upon the principle that each piece of property which contributes sewage or drainage waters, to be carried down and delivered at the ultimate outfall, is interested in the efficiency of every foot of sewer or drain through which such sewage or drainage waters must run to reach that point; and also upon the correlative principle, that all property thus dependent upon an indispensable part of an important

system, is interested in the success of the works as a whole, and hence should bear a portion of the cost of their construction and maintenance.

Many cases of the application of this principle in the ordering of public affairs might be cited: the community of interest is recognized in taxing unimproved and unoccupied property to meet the cost of constructing water works, as is frequently done by municipalities; and the operation of our public schools depends largely upon tax revenues, collected from those who have no possible concern in the working of the educational system, other than a general interest in the welfare of the country, this latter to be advanced by cultivating, at public expense, the minds of people who otherwise might remain ignorant.

As I have before remarked, it seems that in establishing a rule for guidance preliminarily, in the matter of designating regions which might properly be organized into drainage districts, the Legislature has recognized this principle as fitting, and directed its application, by saying that each drainage district as primarily designated by the State Engineer, shall consist of a territory drained by one natural system of drainage; thus in effect defining a *drainage district*.

In the primary designation of districts under the *Act to promote drainage*, I must apply this definition in its broadest sense; for just as soon as I depart from such application of it, then do I cut loose from the rule, and the outlining of a district becomes a mere discretionary action to be influenced by judgment as to equities or necessities; and, acting as an expert, I have no such discretionary power.

For instance, it may be said that the Feather River basin comprises "a territory drained by one natural system of drainage," and hence should be designated as a drainage district. Now, the Feather River is a branch of the Sacramento, emptying into that stream about sixty miles above its outfall into the bay. If I may name its drainage area as a proper district under the rule laid down, so might I just as well name the country drained by one of its tributaries—the Bear River, for instance—and then a tributary of that smaller stream might with equal reason be selected, and so on down, until I would find myself designating the most restricted valley with a single rill running through it, as "a territory drained by one natural system of drainage."

From what has preceded, the reason why such a tributary drainage area can not be regarded as "a territory drained by one natural system of drainage" should be apparent: until the ultimate outfall, at tide water elevation, is reached, complete drainage is not accomplished; and a region which does not embrace the main stream and



its tributaries to this outfall, is not such an one as is defined in the Act, and to be pointed out by the State Engineer.

Moreover, this modification of the idea of what constitutes a natural drainage district, would be exceedingly difficult to apply in practice in the Sacramento Valley; for, on attempting to subdivide the valley into drainage districts, great difficulty in establishing lines of division upon any principle whatever will be found, as a study of the topography of the region will immediately convince any one. For instance, if there were well defined watershed lines between natural drainage ways, district boundaries might follow such lines. On the contrary, however, all through the valley the main streams run upon ridges, and a hollow or basin occupies the space between them. This is noticeably the case between the Feather and the Sacramento, where it would be absolutely impossible to draw a line between two districts which could be maintained upon any ground, other than that of a simple arbitrary ruling.

#### THE INTENT OF THE LAW.

Aside from the matter of principle involved in the rule of action laid down to govern in the designation of drainage districts, there is the intent of the law with reference to the work to be done, and the useful end to be attained, which must be subserved.

So far as the Sacramento Valley proper is concerned, there could be no material subdivision of it, in the matter of forming drainage districts, without seriously affecting the working of the statute in this regard. To consider this matter one must have a clear understanding of the objects of the measure, and these, in their turn, rest upon the necessities and possibilities in the field for its application.

Now there exists a necessity for a systematic and sustained treatment of the drains of the Sacramento Valley throughout their courses in the valley proper, in order that the evils complained of—the deterioration of the rivers as water-carrying and navigable channels, and the damage to land from the effects of the flow of mining tailings—may be corrected.

As I have endeavored to show in my report to the Legislature, the Sacramento below the mouth of the Feather River, never can be brought back to its former comparatively useful and efficient condition (much less improved beyond that stage, as it should be), until there is a simultaneous management of the floods of the Feather and the Upper Sacramento, above that point.

And so, there can be no management of the Sacramento River below any point—the mouth of Butte Slough, for instance—without



a control and improvement of that river above, to the highest point where its waters escape into the basins which flank it.

In like manner, there can be no hope of successfully treating the river as a flood-carrying channel in its upper courses, without, at the same time, improving it below, unless we deliberately relieve the higher regions by precipitating the floods upon those lower down stream. And this course would bring its own retribution; for lower obstructions will soon make themselves felt in their effects up stream, both as to silting up of beds and forcing the general spread of inundations—results destructive to the navigable and other valuable qualities of the channels.

Hence there exists a necessity for a treatment of the Sacramento River from the highest point where its floods may escape from their proper channel to the ultimate outfall at tide level in the bay.

Recognizing such necessity in this and other similar cases, the Legislature passed the *Act to promote drainage*, intending, as I believe, to provide for the construction and maintenance of works that will (1) protect property from damage likely to be occasioned by the further deposit of mining tailings in the streams, and by the movement and effect of the detritus already in their beds; that will (2) protect the river channels—particularly those which are or may readily be made navigable—from further damage; and that will (3) result in the improvement of these rivers as water-carrying and navigable streams. This intention is made apparent, not only by the evident recognition of the necessities of the case, as evidenced by the passage of the Act, taken as a whole, but by the several specifications of the scope and nature of the work contemplated, as set forth in various sections thereof.

It being the case that the Legislature contemplated and desired such results, it would not be affording a proper opportunity for the execution of this law to make any material subdivision of the valley proper in the formation of districts; for I hold that to accomplish the results aimed at, the Sacramento River from Red Bluff or Tehama to the Suisun Bay, and the Feather River from Oroville to its mouth, should be under one control; that they must be improved as flood-carrying channels, and maintained as such under the one direction. It has been the fatal flaw in all dealings with these rivers that they have been desultory, unsystematic, piece-meal. It was the burden of my recommendation to the Legislature that this ordering of things should be remedied; and, as I understand, the *Act to promote drainage* has been passed in accordance with this recommendation, and means have been provided to carry forward the work necessary to manage the debris and improve these streams. This being the

case, there can be only one district in the Sacramento Valley, and it must embrace at least all the territory in the valley and dependent upon the rivers, between the points above mentioned.

With this exception, namely—that the territory near the mouth of the Sacramento, lying between it and the San Joaquin River, and in part subjected to the influence of the floods from both rivers, or their tributaries, and not distinctly drained by either, but which has been included in the district heretofore outlined, might with propriety be set off into a district separate from either that of the Sacramento or that of the San Joaquin; for this territory, comprising several low islands, is in the common delta of the two rivers, and cannot, strictly speaking, be ranked as exclusively in the valley of either one.

#### AMENDING THE REPORT OF THE STATE ENGINEER.

But though any subdivision of the Sacramento Valley proper is inadmissible in the matter of forming drainage districts, that is to say, although there can be but one district in that valley, as I believe, which will fulfill the idea embodied in the law, render possible the success of the work, and thus carry out the intent of the law making power, I am free to admit that there are parts of the valley—and more particularly are there large portions of the drainage area tributary to the Sacramento River and the valley proper—which are but remotely interested in the work to be undertaken, as compared to other portions of similar character. But from this point of view, the question of district boundaries takes a different aspect.

Should the State Drainage Commission decide that it has authority to amend my reports concerning the outlines of drainage districts, otherwise than upon the facts in each case—as to whether I have properly designated the “territory drained by one natural system of drainage,” or not—then its action, presumably, will be governed by considerations of equity; and, as near as may be, those regions which, from the point of view usually taken in California, have no more interest in the success of the works contemplated than any remote part of the State, not in the drainage area, will be excluded from the drainage district.

As an engineer, in this case, I have already performed my duty under the law, by pointing out the boundaries of the Sacramento drainage area—the “territory drained by one natural system of drainage” in the Sacramento Valley. And now if the Commission decides that it will amend my report, as I have suggested it might deem proper, I will, as a member thereof, consider the other aspects of the matter, and to this end I respectfully call attention to the following points:

## THE INTERESTS INVOLVED.

Aside from the general interest on the principle heretofore mentioned, which all residents and owners of property within a drainage area should have in the development and maintenance of its drainage-ways—the main river and its tributaries—certain sections of country will of course be particularly affected by the improvement of the streams as flood-carrying and navigable channels.

All of the region whose produce and supplies might be transported advantageously by water is directly interested in the improvement and maintenance of the navigable stream in its drainage area; for water carriage is the cheapest of all transportation, and is the great regulator of railway rates.

All of the area whose lands might be inundated, or whose communication might be cut off in time of flood, or which depends, for its trade, upon adjacent regions thus unfortunate, is interested in the development of a drainage system which will render possible the prevention of such overflow.

Both of these motives for immediate interest are warranted by existing facts over a large portion of the Sacramento Valley. The direct interest in the navigation of the river is even more widespread within its drainage area; and there is also the general, as well as direct, interest in the prosperity of the mining industries, which, of course, finds place in a considerable portion of the region spoken of:

The prosperity of the gravel mining interest, from the point of view of the Act to promote drainage, must rest upon a continuation of mining operations without resulting damage to the public streams or private property. That interest, presumably, affects the mine owner, his employes, trade people, merchants, and all dependent upon them for employment or trade.

There are, then, in the Sacramento Valley and its drainage area, three great classes more directly to be affected by the result of the works contemplated under the Act mentioned :

*First*—Those interested in the preservation, improvement, and maintenance of the navigation of the rivers.

*Second*—Those interested in the prevention of widespread and prolonged inundations, or the prevention of overflow in any particular quarter.

*Third*—Those interested in the prosperity of the mines whose working causes damage, and in the prevention of damage to private property and public channels.

Putting out of view the primary principle embodied in the law—the idea that all within the drainage area of a river are equally inter-



ested in its preservation and improvement, except those deriving a direct substantial gain or prevented from suffering an immediate pecuniary loss, which exceptions are provided for in the bill—we may conclude that the lines within which lie the regions interested, as above, in the navigation of the rivers, the prevention of inundations, the prosperity of mining interests and the prevention of damage from the working of the mines, will constitute the proper boundaries for a drainage district in the Sacramento Valley.

At the outset of an endeavor to make some suggestions whereby these lines may be recognized, it may as well be admitted that it is not possible to fix upon them with any considerable degree of exactitude, except that it be attempted after a most thorough examination into the conditions and movements of trade in the valley, and be based upon a graded rule as to degree of interest. In other words, a district can not be outlined within which it may be said that all are equally interested in the contemplated works and the results thereof. But then, can this be said of any public work? Can it be said that all parts of the State are equally interested in the prosecution of any public work for which they are taxed? Can it be said that all lands in any reclamation district have been, or can by any possibility, be equally benefited by the construction of its defensive works, or that they have been improved just to the amount of their assessment, though based upon benefits according to the judgment of some fair and skillful referee?

It is not given to human wisdom to adjust such matters without some error, and the different minds of men influenced by views from different standpoints according to local interests or mode of thought, make such discrepancies appear far more flagrant than they really are, or may perhaps actually twist the result into an apparent injustice in the direction opposite to that which it really is. And thus it is not to be expected that this duty of outlining a district to be taxed for the preservation, improvement, and maintenance of these rivers, and the disposal of mining detritus, can be performed in a manner which will be, or even, to many minds, seem to be, equitable and just.

#### SOME PROVISIONS OF THE DRAINAGE ACT.

The *Act to promote drainage* has provided four sources of revenue from which funds are to be derived for the construction, maintenance, and management of the works contemplated and necessary:

*First*—A general State tax levy of “one twentieth of one per cent. on all taxable property in the State;” the revenue from which to constitute a State Drainage Construction Fund. The moneys of this fund are to be expended wherever necessary “within the drainage



districts formed," so that they are presumably not to be devoted exclusively to purely local work, but are in part available for work in any other drainage district than that of the Sacramento Valley, when such other shall be formed. (See Section 24.)

*Second*—A district tax of "one twentieth of one per cent" on all the property in the district," the revenue from which to constitute a District Construction Fund for the district assessed. The moneys of each such fund are to be expended wherever necessary, within the district to which it belongs. (See Sections 15 and 16.)

*Third*—All lands *reclaimed*, as the result of the work to be carried forward under the Act, are to be assessed the value of their reclamation, to an amount not in excess of three dollars per acre, and the revenue thus obtained is to go into the construction fund of the district in which said lands are situated. (See Sections 21, 22, and 23.)

*Fourth*—The owners of "all hydraulic mines, and all mines washing earth or ores with water running into a district," are required to pay annually an assessment of "one half of one cent for each miner's inch of water of each twenty-four hours' run, used during such year," which money is to go into the construction fund of the district in or into which such water runs. (See Sections 19 and 20.)

All the moneys raised under the provisions of the Act are to be "used exclusively for the construction of dams for impounding debris from the mines" within any district, or whose waters run into any district, "and for the improvement and ratification" [rectification,] of river channels in which said debris flows. (See Section 24.)

#### THE FLOW OF MINING DETRITUS—SACRAMENTO VALLEY.

Mining debris flows into the American River and is thus carried into the lower Sacramento River, and although there is not visible any considerable damage, of the character to be seen along the Bear and Yuba rivers, to private property, from the effects of the detritus of the American, yet has it done as much, if not more, harm to the general interest of the State and of the Sacramento Valley, than that of any other stream. Its sands are about all carried into the main channel of the great navigable river of the State, and this channel is being rapidly destroyed, to the detriment of the State at large, the whole Sacramento Valley more particularly, and at loss to the owners of low lands and property in that valley and along the river, which are rendered more difficult of reclamation and protection.

Northward from the American River, on the east side of the valley, all of the principal streams as far as Chico Creek bring mining detritus from the mountains, in quantities readily appreciable, and most of them spread a large portion of their sediments over lands

adjacent to their several courses. Thus, where the greatest show of damage is apparent, the least real harm may have been done to the general interest of the State and of the valley at large; for although the destruction of a few thousand acres of fine farming land may be a death blow to the fortunes of the individual owners thereof, and an indirect loss to the community, it is as nothing for the State or the valley at large to consider, when compared to the destruction of the Sacramento and Feather Rivers as navigable and flood-carrying channels. I make these remarks to emphasize the mention made of the influence of the American River detritus, which, though less apparent to the casual observer than that of the Yuba or the Bear, is in reality of equal if not greater moment than that of either of the other streams, so far as public welfare is concerned; for while a large part of the Yuba and Bear River sands have found and still do find a resting place upon the plains and bottom lands, about all of the American River detritus is forced into the main river of the valley, at a most important point in its course.

The streams from Chico Creek northward to the Sacramento River do not, so far as I am informed, transport any mining detritus.

The Sacramento River brings sands and slums from the mines of Shasta county, in small quantity to be sure, as compared with that transported by the waters of many other streams entering the valley, but still in amounts sufficient to discolor the waters much more than they formerly were, as I am informed, and the amount of sand which is rolled along the bottom of the stream at time of flood may be very great.

#### THE INTEREST IN NAVIGATION.

Concerning the scope of country interested in the preservation and improvement of the rivers of the State, and more particularly those of the Sacramento Valley, I beg leave to call your attention to the following extracts from the report of the Honorable B. F. Tuttle, Commissioner of Transportation for the years eighteen hundred and seventy-seven and eighteen hundred and seventy-eight. At page 49, under the heading of "Navigable Waters in California and their Influence on Rates of Transportation," Mr. Tuttle says:

Fortunately for this State, nature has been more liberal in providing water-ways for the free use of our people, for transportation purposes, than in many other portions of our common country. Following are some statistics of the tonnage which is employed upon the inland navigable waters and in the coast trade, which will serve to show what influences operate to keep the cost of transporting the products of the agricultural portion of the State to market at low rates. Moreover, they will also show that private capital has not hesitated to seek investment in that species of property. Such being the fact, the State cannot be too careful in guarding against the obstruction of its great water-ways, and every legitimate effort should be made not only to preserve but also to improve their navigation, as the sure and safe method of protecting her producers from high rates for transportation. \* \* \* \* \* A judicious system of improvement of the inland waters of this State would do more to keep the cost of

transporting its products to market at low rates than scores of penal enactments and inflexible tariffs for the regulation of charges by transportation companies. The favored location of most of our agricultural and timber lands renders extortionate rates impossible, if the navigable waters of the State are cared for as their importance warrants.

The following places on the California Pacific Railroad, from their proximity to navigable waters, are enabled to ship their freights at rates fixed by the cost of water transportation: Napa, Suscol, Vallejo, Benicia, Bridgeport, Suisun, Elinira, Batavia, and Dixon.

The Northern Railway, located on the west side of the Sacramento River, and completed as far up as Willows, competes for the business at the following places located on the river: Knight's Landing, Elk Horn, Monument, Bostwick's Ranch, Smith's Ferry, Three Rivers, Colgrove's, Poker Bend, Mosquito Ranch, George Howell's, Big Orchard, Minis Ranch, Big Eddy, Dry Slough, Budd's Ranch, James Powell's, Perdew's, Eddy's, Grimes', James Wilson's, Twenty-mile Bar, Grand Island Mill, Sycamore, Meridian, Moore's Ferry, Butte Creek, Colusa, Sherman's, Randall's, Reynolds', Nine-mile House, Manhattan, Boggs', Princeton, Butte City, Call's Ranch, and other points on sloughs leading off from the river.

The tariff on the Central Pacific system is influenced by the Sacramento River, above Jacinto, at Hite's, Parrott's, Dayton, Monroeville, Reade's Landing, Chico, Bidwell's, Walsh's, and other points as far north as Red Bluff, and as far south as Firebaugh's Ferry in the San Joaquin Valley, including Hill's Ferry, Salt Slough, Grayson, San Joaquin City, Point of Timber, Antioch, New York, Pittsburg, Pacheco, Martinez, and other points down to Oakland and south to San José. On the Northern Division of the Southern Pacific Railroad, similar examples might be given.

According to this report the river steamers, sixty in number, in constant or occasional use on these waters, have a total tonnage of ten thousand nine hundred and ninety tons, and the forty barges, ten thousand six hundred and seventy-three tons.

At page 54, I find, after certain tabular statistics, of which the above is a summary, so far as they apply to river steamers and barges, the following:

It will be seen by the foregoing that the water-craft, engaged on our inland waters and along the coast, comprises a very important part of the total of the transportation facilities of the State.

As a rule no railroad can supersede transportation by water, unless it can perform the like service more cheaply and advantageously; and when this happens, it follows that the shipper reaps the benefit. No one at this time would advocate a statutory prohibition of competition, although that is not wholly free from irritation, by producing "discrimination."

It has been suggested and recommended that competition in this State be fostered, even by the establishment and maintenance of river and ocean lines of steamers, with rates fixed by the State, and that State aid be given to maintain such rates when not remunerative.

At page 58, under the head of "Railroad Monopoly," the Honorable Commissioner sets forth very clearly the value of the navigable streams to the State at large, and more particularly to the Sacramento and San Joaquin Valleys, in the following words:

In this State, with few exceptions, one single corporation has undertaken to supply railroad facilities for the whole people. In doing this, lines of railroad have been projected and constructed through districts of country offering few inducements for profitable traffic. These lines traverse the principal valleys through which run also the two great water-courses of the State. They also skirt the great bays and estuaries leading into rich interior valleys. Bordering upon, and adjacent to these inland water-ways, extending back for a distance of from five to fifteen miles, lies the greater part of the productive portion of California. The same may also be said of the agricultural land along the coast, the products of which find their way to market upon the ocean. Upon these water-ways ply every species of steam and sail-craft adapted to their navigation, and it is not an overestimate to say that three fourths of the agricultural, and nine tenths of the forest products, reach the market independent of the railroads, or, in other words, the rates for transporting them are determined by the facilities afforded by these means of transportation.

If these water facilities did not exist the railroads would indeed have a perfect monopoly of the carrying trade. With these agencies, however, effectively preserved, offering as they do, opportunities for profitable traffic to the water-craft, so far as the carriage of the products of the soil to the general markets and of supplies to the interior is concerned, there is not much to fear from railroad monopoly.



To illustrate the effect on local railroad rates of water competition on our navigable rivers, the following example is given at page 61 of the Commissioner's report:

To illustrate this subject, take a special case: San Francisco and Sacramento are connected by navigable waters, and in the exchange of commodities between the two cities they have always the benefit of cheap transportation. A railroad one hundred and fifty-one miles in length connects them, and passing through a number of interior towns heretofore having imperfect inter-communication. By rail one of these places (we will call it Galt) is located twenty-seven miles from Sacramento and one hundred and twenty-four miles from San Francisco. How has it been affected by the construction of the road? Before its construction freight from San Francisco destined for Galt was shipped to Sacramento by water, thence by wagon to Galt. Since the completion of the road there are two routes to Galt from San Francisco—one by rail direct, the other by water navigation to Sacramento, thence by rail. Taking the water route, the rate for shipping to Galt is found, by adding to the water rate from San Francisco to Sacramento, the rail rate from Sacramento to Galt. The latter rate is much below the former rate charged by wagon, and to the extent of this difference the shipper at Galt has been benefited by the building of the road, not to mention the greater convenience and saving in time, of which he now receives the benefit.

There would be no complaint if the road terminated at Galt, but a new route having been opened to Galt direct from San Francisco, one hundred and twenty-four miles, gives rise to all the trouble. The railroad is obliged to carry freight from San Francisco to Sacramento via Galt at the low water rate, which is below the average cost of railroad transportation; but if it derives a small profit from this source, it is enabled to make a reduction in rates between San Francisco and Galt direct, and between Sacramento and Galt. It is obliged, however, to charge the shipper at Galt more per ton per mile for the distance of one hundred and twenty-four miles, than is charged per ton per mile to Sacramento, but the total charge can in no case exceed the sum of the water and rail rate from San Francisco to Galt via Sacramento, else the latter would be the preferred route. It cannot be contended that it is unjust to the shipper at Galt because he is charged more proportionately than the shipper at Sacramento, who always had the benefit of the water rate. To do so would be to compel common carriers to expend their money in overcoming natural obstacles, and in placing the benefits arising therefrom at the disposal of those less favorably situated.

Railroads cannot successfully compete in the transportation of freights with carriers on navigable waters. The principal element utilized by the latter costs them nothing, while the former is compelled to make a heavy expenditure before he can move a bale of goods.

And still again, at page 75, Mr. Tuttle has, in conclusion, summed up his estimate of the importance of these navigable streams, as follows:

The statistics relative to our inland commerce, hereinbefore presented, will serve to demonstrate the urgent necessity in the interest of commerce, as well as of nearly all other industrial pursuits, of preserving and improving the navigable waters of the State. This is a subject which the Legislature can take cognizance of, and the attention of that department of the government is directed to its consideration.

#### GENERAL DEDUCTIONS.

*First*—The competition, based upon transportation by water, constitutes a controlling factor in regulating railroad rates on freight, and it should be given free scope.

*Second*—It is of the gravest importance that the extensive water-ways of the State should be kept open for the public use; and their improvement demands governmental care and supervision.

#### MODIFICATION OF REPORT SUGGESTED.

I shall not attempt to designate the exact limits to which the Sacramento Drainage District should reach in view of the considerations just mentioned, but rather to make certain illustrations of the modifications of the district bounds from the limits of the natural drainage area, which may with propriety be made in case the Commission decides to be governed in its action by what may appear to be a more equitable distribution of the burdens of taxation than could be effected by embracing the whole watershed area within the district.

In the first place, I suppose it will be admitted without question, that all lands and property threatened with overflow, or which have their communications occasionally cut off through being surrounded by overflowed tracts, all marginal river lands, low basin lands, tule swamps and islands in the Sacramento Valley, are interested in the preservation and improvement of the Sacramento and Feather Rivers as flood-carrying channels. For although the work of improvement of these channels may not result in the complete reclamation of, or immunity from danger to any particular piece of property which may be considered, yet the development of the flood-carrying capacity of the great drains of the district will, without doubt, benefit property so situated, and render its reclamation or protection a possible and far less expensive work. I consider, therefore, that all such property in this valley may well find place in the district.

It has been said by the honorable Commissioner of Transportation, already quoted, that the river navigation now controls the rates of freight on the railroads in Sacramento Valley as far northward as Red Bluff, yet the river is navigable in its present condition only to a point thirty-three miles, in a straight line, south of the town mentioned, and from this point even with the river in its present condition, during the grain shipping season not more than a third of a load can be brought away on the barges, and a full load cannot be carried at the season of greatest traffic until a point is reached well below where the flood waters first escape from the channel into the east basin below Chico Creek.

With some improvement in this upper part of the river, therefore, it would seem that its navigation would be a boon to about the whole of Tehama County, but that the lands and property beyond in Shasta or Lassen Counties would not receive any material benefit from such improvement. Hence, if it should appear that there is no necessity for including any portion of the last mentioned counties, on account of the mining going on there, they might well be left out of the district.

The Clear Lake and Cache Creek mountain watersheds on the west, and a large portion of that of Putah Creek, are beyond the limits of the influence of the Sacramento River on their traffic rates, and either find a business outlet over the mountains into Napa Valley, or by a route independent of the river and not in competition with it, direct to the Suisun or San Pablo Bays. A portion of the plains west of the Yolo basin, in Solano County, and within the limits of the Sacramento drainage area as heretofore outlined, is also not within the limits of the influence of the river navigation on its freight transportation rates.

Hence, it would seem that these regions too, might with propriety be left out of the district, and then a line would have to be struck

west of the Yolo basin through Solano and Yolo counties, keeping away from the river at the limit of the influence of its navigation on transportation rates.

With respect to the region directly interested in the prosperity of the mines which occasion the damage sought to be averted, I simply remark that my studies and observations have not revealed any principle upon which any portion of the mining counties, along the east side of the Sacramento Valley, whose waters shed to the west, can be left out from the district.

Though an extended study in detail might possibly show some considerable sections of country which could be segregated as being independent of mining of the character whose life it is sought to prolong, yet it must be remembered that the counties referred to are all mining counties, all largely dependent upon hydraulic mining, and, from the point of view of the *Act to promote drainage*, all largely interested, as counties, in the result of the work contemplated under it—the success of the work of disposing of the detritus so as to quiet the complaints against mining operations.

#### CONCLUSION.

I have now submitted a report embodying the results of my special examinations, concerning the establishment of drainage districts, up to date; have recommended the formation of one such district in the Sacramento Valley, as defined in the law by which I am governed; and have pointed out, in a general way, how the district, as outlined by the natural drainage basin of the Sacramento and its tributaries, may well be modified in its extent according to certain equitable considerations which the State Drainage Commission may consider, but which the State Engineer could not take into account, as against the rule laid down specially for his guidance in the statute.

It should be borne in mind that this is a report to date, only, on the subject of establishing drainage districts, and that as occasion requires other districts may be designated. It will be a subject for further inquiry, as to whether or not a necessity exists elsewhere in the State for the operation of this law, and just what territory should constitute a district in each case where the necessity does exist.

Very respectfully submitted,

WM. HAM. HALL,  
State Engineer.

OFFICE OF THE STATE ENGINEER,  
SACRAMENTO, May 26th, 1880. }



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